

REMARKS

In the Office Action, the Examiner rejected Claims 1, 3-5, and 7-11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,052,042 issued to Hedgemann et al., in view of U.S. Patent No. 4,854,946 issued to Heijwegen et al. Claim 2 was rejected under 35 U.S.C. 103(a) as being unpatentable over the Heijwegen et al. reference in view of U.S. Patent No. 2,760,635 issued to Dahlstrom. Claim 6 was rejected under 35 U.S.C. 103(a) as being unpatentable over the Hedgemann et al. reference in view of the Heijwegen et al. reference, and further in view of U.S. Patent No. 4,472,181 issued to Herrlander.

Summary of Applicant's Amendments

By this response, Applicant has amended independent Claims 1 and 7, and added new Claim 13. Therefore, Claims 1-12 remain for further prosecution.

Response to Rejection of Independent Claim 1

In the Office Action, the Examiner rejected independent Claim 1 under 35 U.S.C. § 103(a) as being unpatentable over the Hedgemann et al. reference in view of the Heijwegen et al. reference. As set forth in more detail below, Applicant submits that the cited references do not teach, suggest, or make obvious all of the limitations of amended independent Claim 1.

I. Amended Claim 1

By this response, Applicant has amended independent Claim 1 to recite a novel aspect of one embodiment of a cement kiln chlorine/sulfur bypass system. More specifically, the bypass system recited in amended Claim 1 includes an air bleed means for receiving the kiln exhaust from the cement kiln. A separating means separates the dust in the gas into coarse particles and fine particles. The bypass system further includes a wet dust collector for receiving the fine particles and exhaust gas from the separating means. The wet dust collector is configured to separate the fine particles from the gas.

Some of the beneficial effects of the bypass system recited in Claim 1 are best explained in the third paragraph of page 3 of the patent application, reproduced below for the Examiner's convenience.

With this invention, since dust in the bled gas containing fine particles is collected by using a wet dust collector, collected slurry can be supplied to a water treatment/desalination apparatus as it is, which eliminates a rinsing apparatus conventionally used in desalting process of chlorine bypass dust, resulting in reduced equipment cost. Solvent used for the wet collection is liquefied substance such as water and slurry containing water, which is able to collect dust and the like in the bled gas. In addition to the above, with the present invention, the cooling of the bled gas and the collection of the chlorine bypass dust are simultaneously carried out by the wet dust collector, which eliminates conventionally installed cooler and hot bag filter, and a large scale storage facility, which is conventionally required for chlorine bypass dust with low specific gravity, resulting in remarkably reduced equipment cost. Further, sulfur dioxide (SO₂) in the combustion gas is desulfurized in such a manner that the sulfur dioxide (SO₂) reacts with calcium hydroxide (Ca (OH)₂), which is generated when calcium oxide (CaO) in the fine particles of the dust of the bled gas reacts with water, to be gypsum. Then, the gypsum is discharged out of the cement kiln system, and is effectively utilized in cement mill.

2. The Bypass System of Claim 1 is Not Obvious in View of the Cited References

As understood, the Hedgemann et al. reference relates to an apparatus for cleaning the exhaust gas of a high pressure blast furnace. The apparatus includes a duct connected to the blast furnace to receive the exhaust therefrom. The exhaust travels down the duct to a hopper which collects the particles present in the exhaust gas. The gas continues downstream where it is treated by a prewasher unit, and an annular gap washer. The gas is then fed into an expansion turbine or through a bypass duct around the expansion turbine.

The Examiner concedes that the Hedgemann et al. reference does not teach a wet dust collector for collecting dust from the gas. As such, the Examiner relies on the teachings of Heijwegen et al. for such disclosure. The Heijwegen et al. reference is understood to disclose a method for treating blast furnace gas. The coarsest particles from the blast furnace gas are removed and wet scrubbed prior to being fed to a treatment device for separating the

remaining coarse dust. The gas dust is fed to a separator where coarse particles are removed through an outlet, while the remaining gas dust is fed to a settling basin. The dust particles are then fed to a second separator having two hydrocyclones. The coarse particles are removed from the hydrocyclones and fed back to the blast furnace.

Applicant submits that one skilled in the art would not be motivated to combine the Hedgemann and Heijwegen references to produce the cement kiln cholorine/sulfer bypass system recited in Claim 1. More specifically, the Hedgemann and Heijwegen references are unrelated to a cement burning furnace; rather, the cited references are directed toward a blast furnace. A chlorine bypass system in a cement burning furnace and an exhaust gas treatment system in a blast furnace are installed for different purposes. In this regard, Applicant submits that there is no motivation to modify the teachings of Hedgemann and Heijwegen because such a modification would render the Hedgemann and Heijwegen references unsatisfactory for their intended purposes. *See M.P.E.P. § 2143.01(V)*¹.

Furthermore, the kinds of gas being treated in the respective furnaces are different from each other. Moreover, in the cement burning furnace, combustion gas is partly withdrawn to remove chlorine and sulfur at a furnace-exit. On the other hand, in the blast furnace, exhaust gas is bypassed on a turbine side for pressure control only. In this regard, Applicant submits that the Examiner's proposed combination is merely the result of impermissible hindsight, and is not within the purview of one skilled in the art.

As such, amended independent Claim 1 is believed to be allowable, as are all claims depending therefrom.

Response to Rejection of Independent Claim 7

Independent Claim 7 is similar to independent Claim 1, discussed above, in that Claim 7 also relates to a cement kiln (i.e., a method of treating a combustion gas exhausted from a cement kiln). Therefore, for the reasons advanced above in relation to Claim 1, Applicant submits that Claim 7 is also allowable, as are Claims 8-11 as being dependent upon an allowable base claim.

¹ If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.

New Claim 12

New Claim 12 relates to a cement kiln chlorine/sulfur bypass system for receiving and treating the exhaust from a cement kiln. The system includes an air bleed means configured to receive the kiln exhaust. An adjustable separating means is in fluid communication with the air bleed means and is configured to separate particles within the kiln exhaust. In particular, the adjustable separating means defines a passage size, such that particles defining a particle size less than the passage size may pass through the separating means, while particles defining a particle size greater than the passage size may be restricted from passing through the separating means.

The particles which pass through the separating means continue to a wet dust collector which separates the remaining particles from the exhaust gas. The wet dust collector is in fluid communication with a circulating liquid tank to receive fluid from the circulating liquid tank. The fluid is combined with the particles to create a slurry. The fluid within the circulating liquid tank defines a fluid pH. The passage size defined by the adjustable separating means is adjustable to control the fluid pH, wherein the fluid pH decreases as the passage size decreases and the fluid pH increases as the passage size increases.

Controlling the pH of the circulating fluid is an important aspect of the bypass system. Applicant directs the Examiner's attention to page 12 of the present application, which states,

in order to prevent troubles caused by scale in the passage of the circulation slurry that is supplied to the mixing scrubber 26, it is necessary to control pH of the circulating liquid in the circulating liquid tank 27 approximately between four and six. Therefore, when pH of the circulating liquid in the circulating liquid tank 27 excessively increases, as described above, the cut size of the cyclone 25 is changed to reduce the CaO content of the fine particles to solve the problem.

Applicant submits that amended independent Claim 1 is distinguishable from the Examiner's proposed combination because such a combination does not teach, suggest, or make obvious an adjustable separating means for controlling the fluid pH.

1. The Cited References Do Not Teach a Separating Means Configured to Control the Fluid pH

Applicant notes that a more detailed discussion of the Hedgemann and Heijwegen references can be found above.

Given that the cited references are generally concerned with treatment of blast furnace exhaust, rather than cement kiln exhaust, Applicant submits that neither reference deals with the pH concerns of treating cement kiln exhaust. In this regard, neither reference appears to disclose an adjustable separating means configured to control the downstream particle size in order to adjust the fluid pH. Accordingly, the references do not disclose each and every limitation of amended independent Claim 1.

Furthermore, Applicant submits that one skilled in the art would not be motivated to modify the teachings of the cited references to include an adjustable separating means because the treatment of blast furnace exhaust does not provide any teaching or suggestion of addressing the pH issues related to cement kiln treatment. The cited references are directed toward a completely different field than the cement kiln bypass system recited in Claim 1. In this regard, neither reference provides any suggestion or motivation to address the pH concerns encountered with cement kiln exhaust treatment. Therefore, Applicant submits that independent Claim 12 is allowable.

Conclusion

In view of the foregoing, the application is believed to be in condition for allowance. Entry of the amendments and issuance of a Notice of Allowance is therefore respectfully requested. Should the Examiner have any suggestions for expediting allowance of the application, the Examiner is invited to contact Applicants' representative at the telephone number listed below.

If any additional fees as due, please charge Deposit Account 19-4330.

Respectfully submitted

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